

# ***Capabilities Based Planning: An Acquisition Perspective***

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**IEEE SMC 2005**

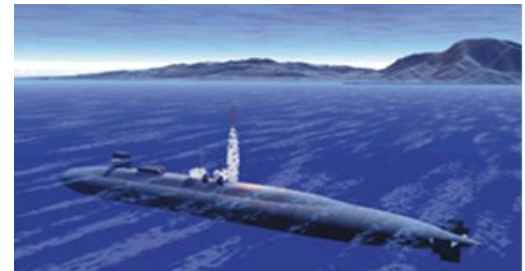
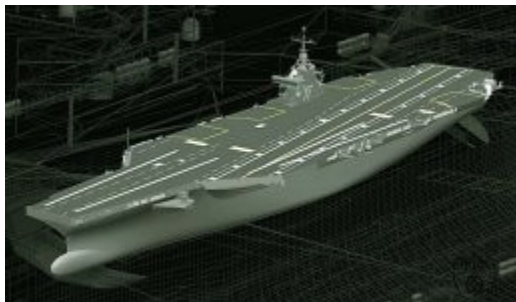
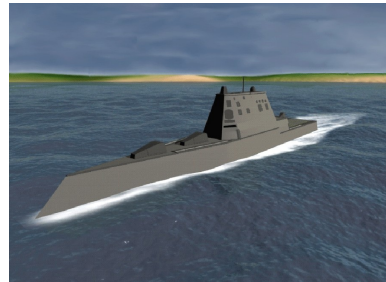
**International Conference on Systems, Man and Cybernetics  
Hawaii, USA - October 10-12, 2005\_**

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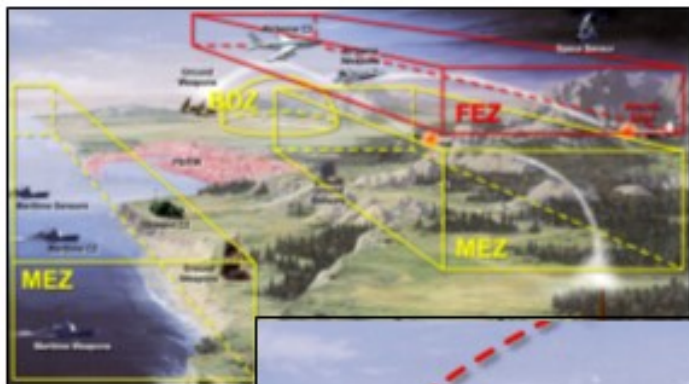
# ***Systems Engineering for Large-Scale System of Systems***

- ❑ A Department of Defense perspective....



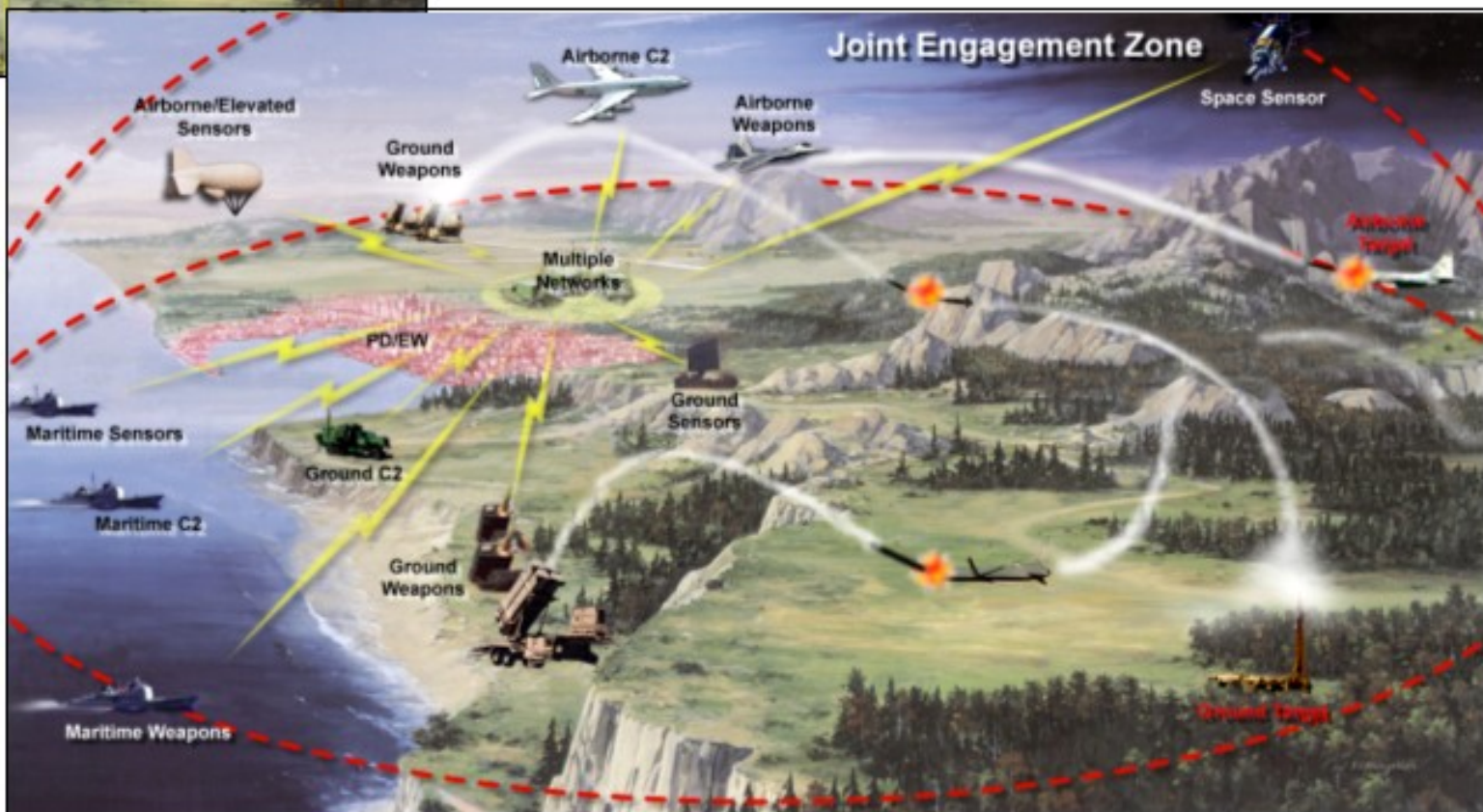


# Large Scale SOS Example: Integrated Air and Missile Defense Challenges



## 2010 Joint Engagement Zone

- ❑ Single Integrated Air Picture
- ❑ Combat ID
- ❑ Integrated Fire Control
- ❑ Automated Battle Management Aids





# ***Defining the Challenge***

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## **❑ Strategic View:**

- Begin to characterize the battlespace in terms of “Capability Areas”
- Sort and categorize the Component systems by capability area
- Define Family of Systems and System of Systems solutions to meet capability area needs

***We call this Capabilities Based Planning***



# ***Capabilities Based Planning (CBP) Objectives***

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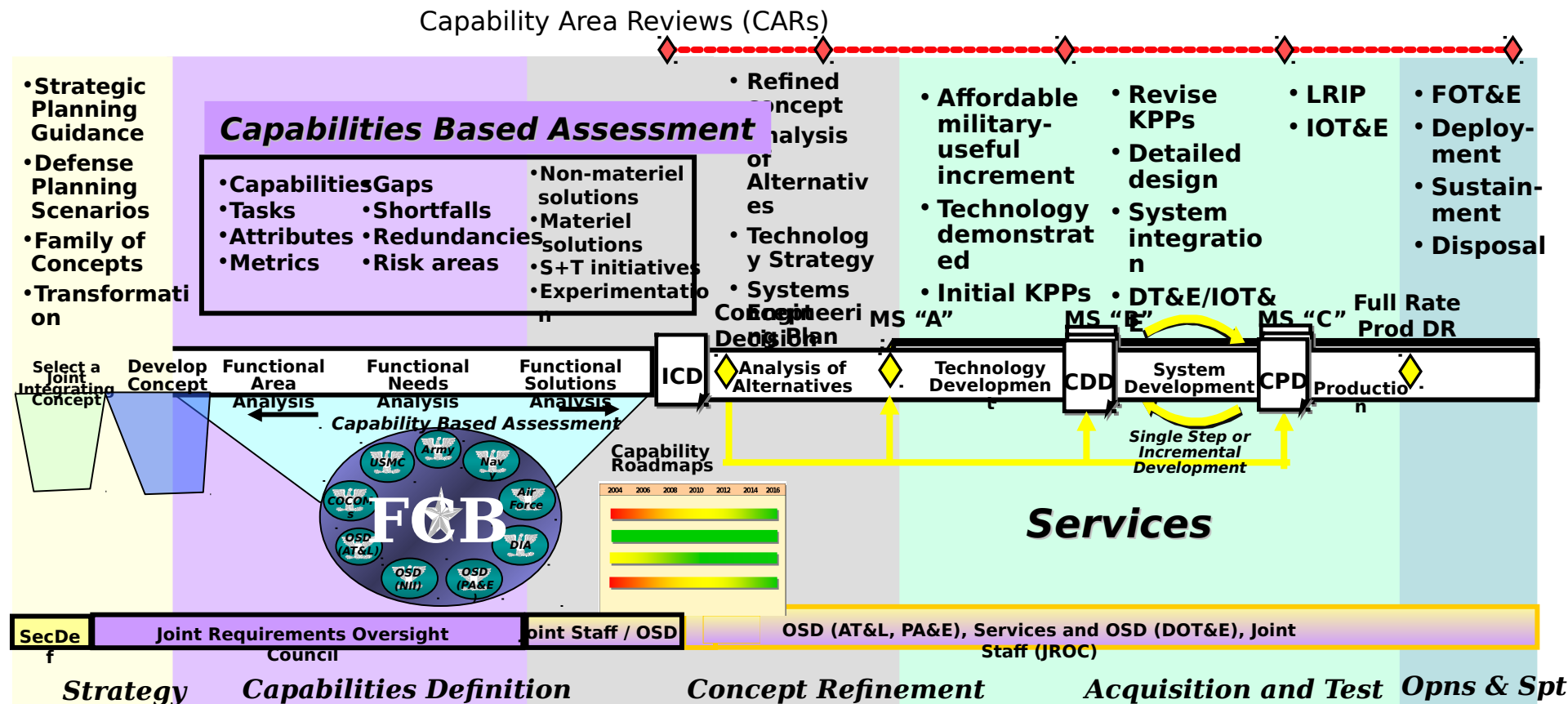
***CBP should be a top-down, competitive approach to weigh options vs. resource constraints across a spectrum of challenges***

Capability Based Planning should:

- ❑ Link DoD decision-making to the Defense Strategy
  - *Encompass the full set of DoD challenges*
- ❑ Inform risk tradespace -- identify joint capability gaps, redundancies, and opportunities
  - *Generate common framework for capability trades*
  - *Couple capability development to operational needs*
- ❑ Facilitate the development of affordable capability portfolios

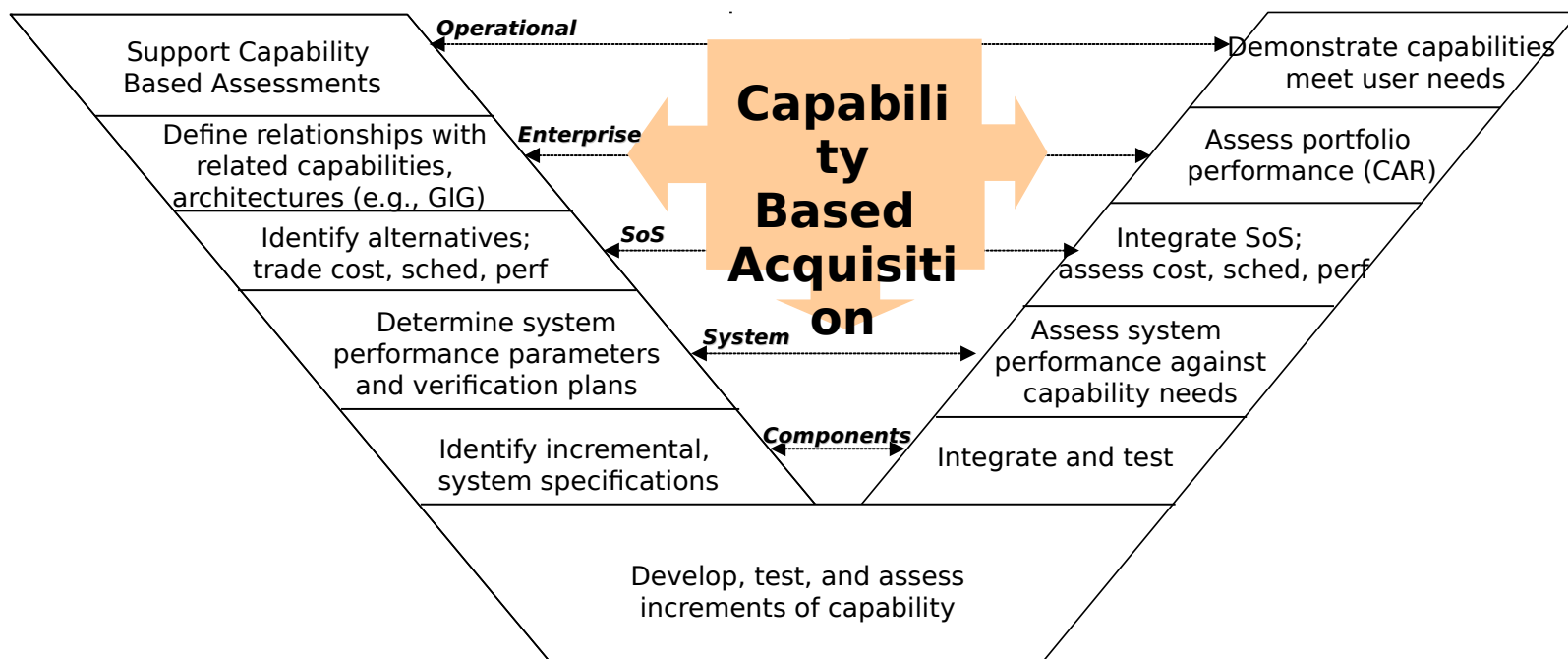
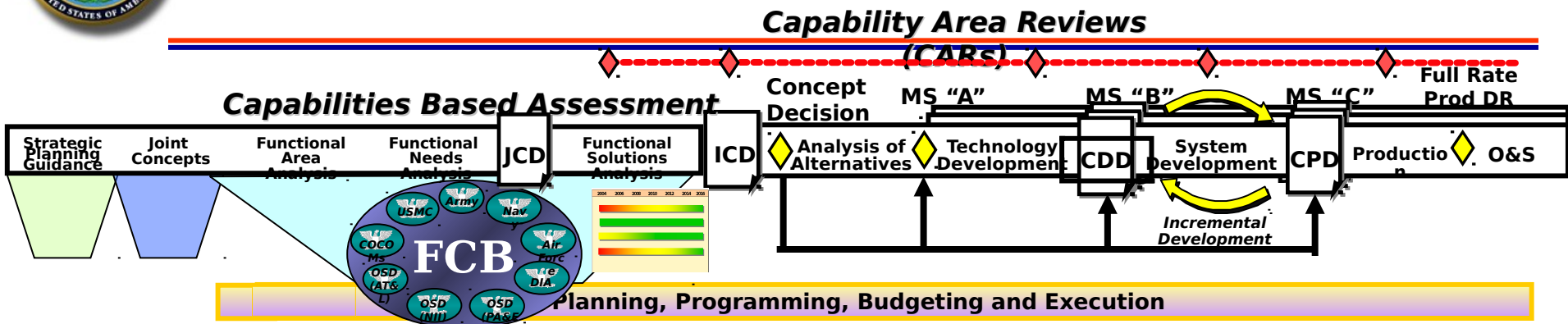


# End-to-End Capabilities Based Planning Process





# Acquisition Engagement



**S&T**

Basic Research  
(TRL 1-3)

Applied Research  
(TRL 4-5)

Advanced Technology  
Development



# ***What have we learned?***

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- ❑ Rigorous, top-down determination of joint capabilities takes time
  - Requires sound analytical baseline, and
  - Cooperation from multiple communities that have not traditionally worked together
- ❑ Capabilities must be satisfied by grouping of legacy, new systems, and technology insertion
  - Solutions will cross organizational and funding “stovepipes”
  - Solutions must integrate with other related capabilities and architectures
- ❑ Incremental acquisition calls for open, extensible system designs that can support future, yet to be defined increments
- ❑ Management oversight of capabilities has ripple effects on individual programs
- ❑ Early and continuous involvement of acquisition in requirements determination allows for greatest leverage to determine optimal, joint solutions



# ***Defining System of Systems Engineering (SoSE)***

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- ❑ Establish a common vocabulary in designations as:
  - System of Systems (SoS)
  - Family of Systems (FoS)
- ❑ Characterize the scalability of SE processes for SoS and FOS
- ❑ Investigate how to optimize SoSE given the complexity of constraints (budgets, schedules, maturity, technology, program independence, etc.)
  - Apply optimization to a pilot
  - How to harmonize SOS and FOS methodologies with the Capability Based Planning (CBP) process?

For Individual Programs... Consider existing challenges